Inter-university Upper atmosphere Global Observation NETwork (IUGONET): Development of metadata database.

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Inter-university Upper atmosphere Global Observation NETwork (IUGONET)

- Development of metadata database -

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7. PPARC, Tohoku Univ.

The IUGONET project - Objectives

Purposes of this 6-year (2009-2014) project are:

- to develop a metadata database (DB) of the upper atmosphere (UA) data accumulated over 50 years since IGY by Japanese institutes/universities.
- to promote effective use of the observational data and comprehensive studies of the UA.
- to investigate mechanism of long-term variation in the UA

This project is supported by Special Educational Research Budget (Research Promotion), MEXT, Japan

Participating universities and research institutes

- Planetary Plasma and Atmospheric Research Center, Tohoku University
- National Institute of Polar Research
- Solar Terrestrial Environment Laboratory, Nagoya University
- Research Institute for Sustainable Humanosphere, Kyoto University
- World Data Center for Geomagnetism, Kyoto University
- Kwasan and Hida Observatories, Kyoto University
- Space Environment Research Center, Kyushu University

IUGONET

Project members

- Tohoku Univ.
  - T. Ono, N. Terada
  - M. Kagitani
- National Institute of Polar Research
  - N. Sato, T. Nakamura, H. Miyaoka, M. Okada, Y. Tomikawa
  - Y. Tanaka
- Solar Terrestrial Environment Lab., Nagoya Univ.
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- World Data Center, Kyoto Univ.
  - T. Iyemori, M. Nosé
  - Y. Koyama, D. Yoshida
- Research Institute of Sustainable Humanosphere, Kyoto Univ.
  - T. Tsuda
  - H. Hayashi (*)
- Kwasan and Hida Observatory, Kyoto Univ.
  - K. Shibata
  - S. UeNo, N. Kaneda
- SERC, Kyushu Univ.
  - K. Yumoto
  - S. Abe

Member of core development team

(*) Lead of development team

京都大学 KYOTO UNIVERSITY

IUGONET

Observations by IUGONET institutions

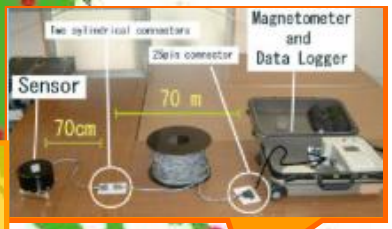
Iceland
aurora imager x2
magnetometer x3

Svalbard: IS radar (EISCAT), meteor radar, aurora imager

Toromso
IS radar (EISCAT)
meteor radar
MF radar

MU radar @Shigaraki

SuperDARN Hokkaido HF radar



Solar observatory (Kyoto Univ.)

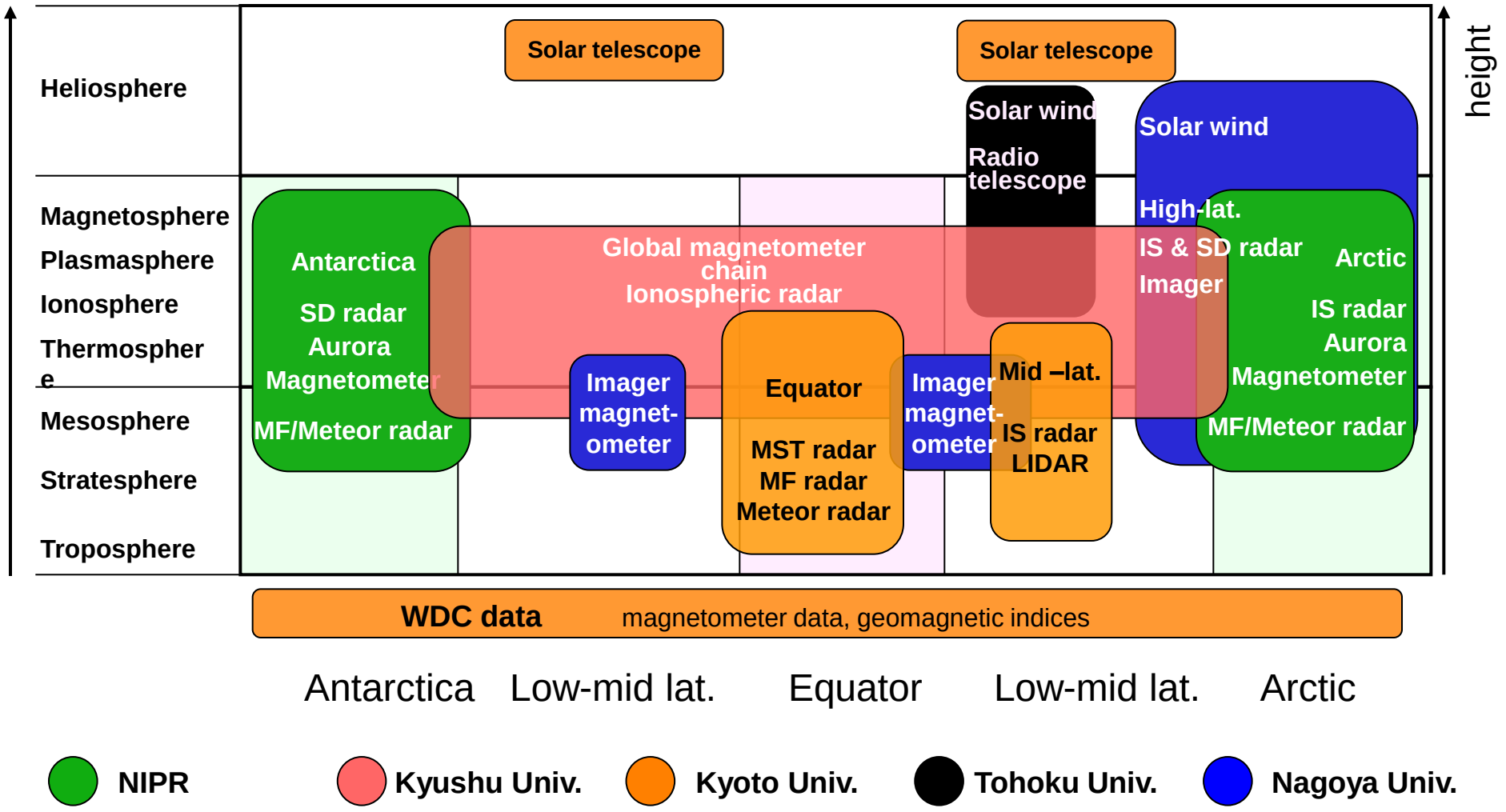
Equatorial Atmospheric Radar (EAR)

Iitate, Onagawa radio teloscope magnetomter

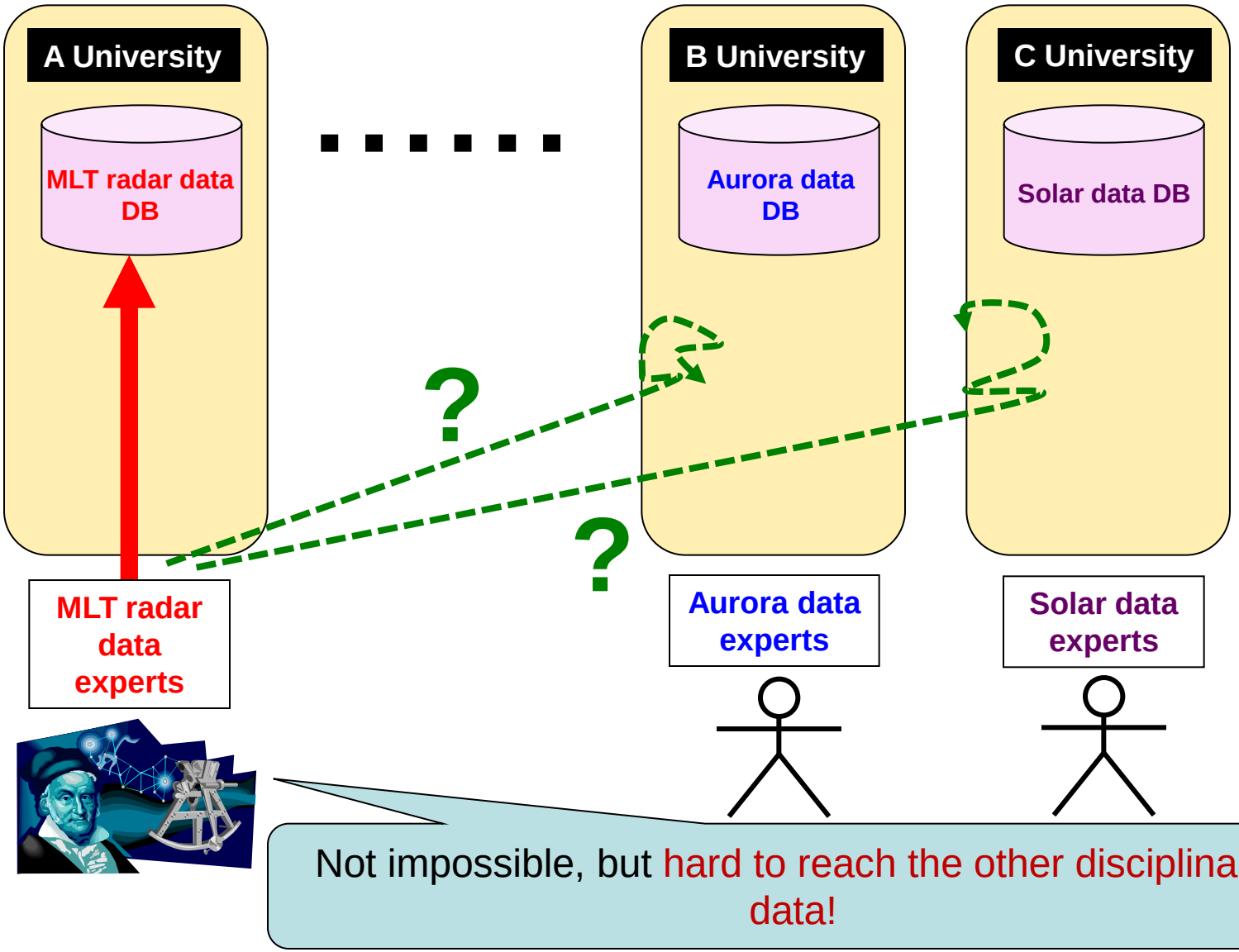
SYOWA base
SuperDARN radar x2
MF radar
aurora imagers
magnetometer chain
ELF obs. (conjugate with Onagawa)

- MST radar
- MF / meteor radar
- MAGDAS magnetometer
- FM-CW radar
- OMTI imager
- WDC magnetometer

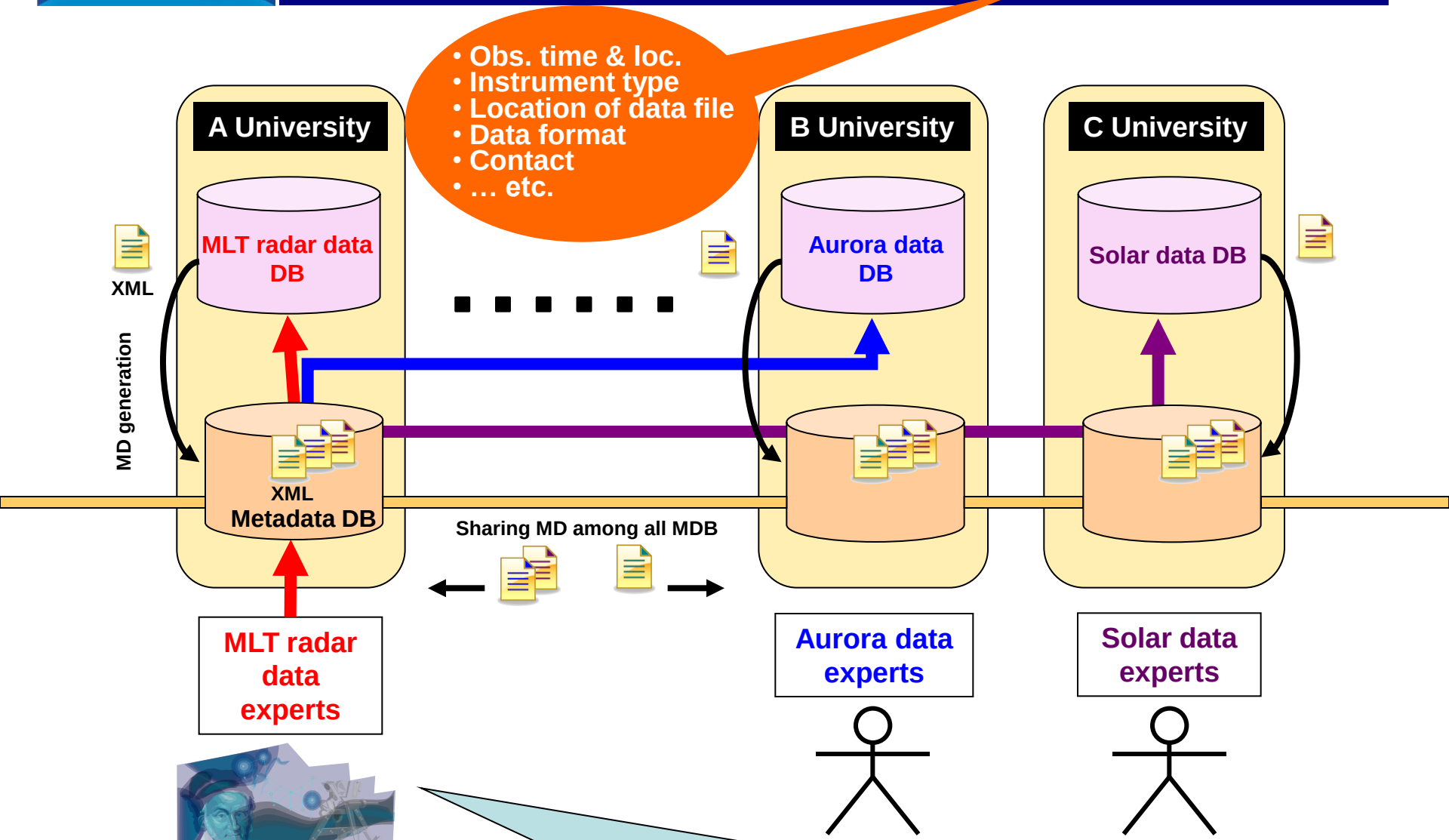
Spatial coverage of observations



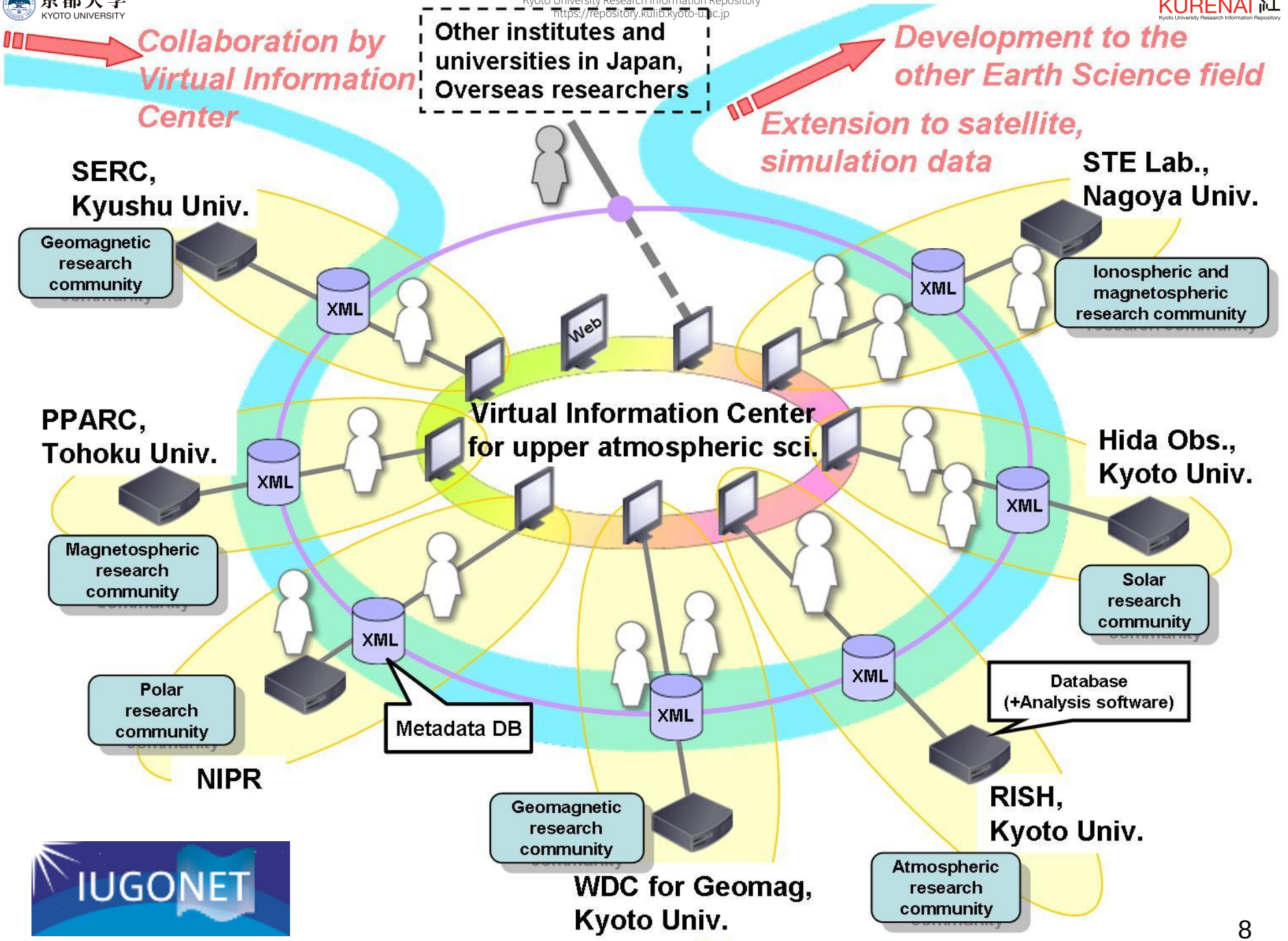
Problem with databases



Database access through metadata DB



Easy to obtain various kinds of UA data from research institutes/universities!

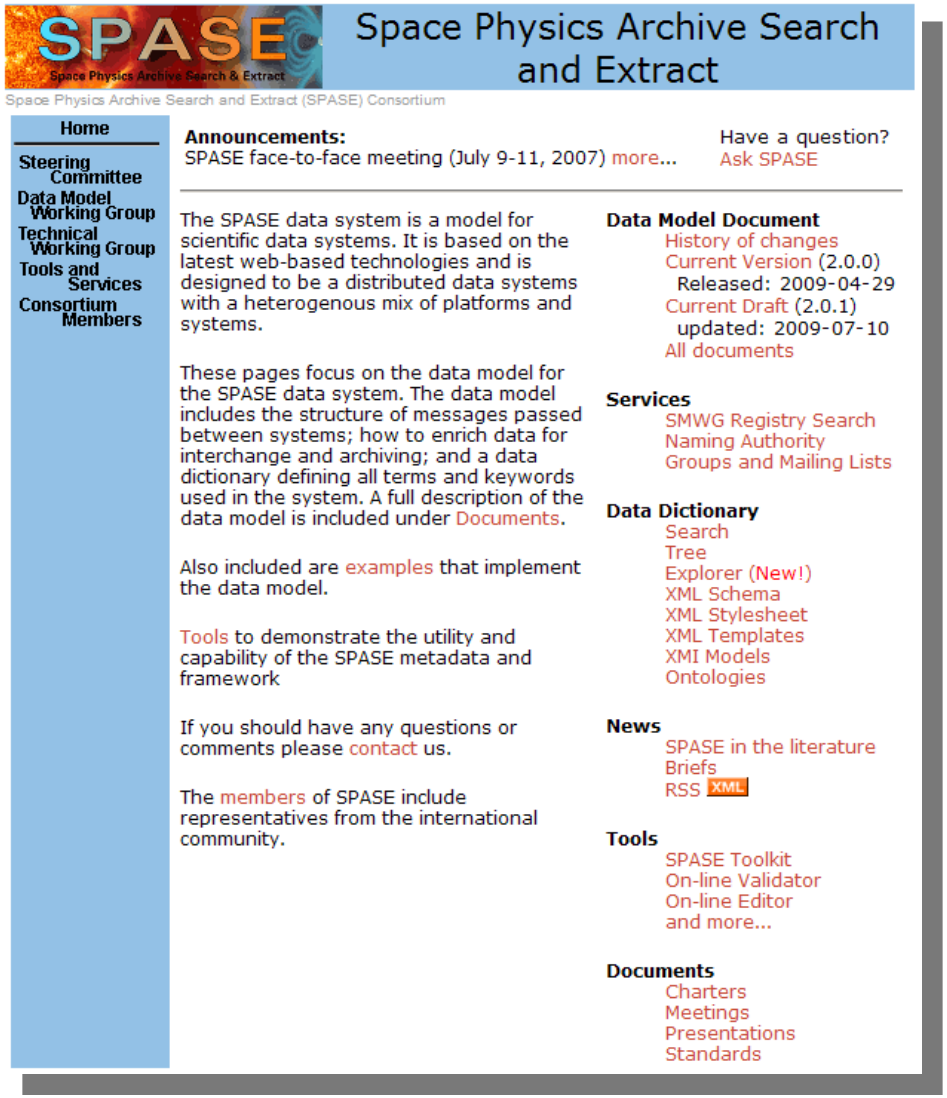


Project Timeline

Task	Y2009	Y2010	Y2011	Y2012	Y2013	Y2014	Detail
Virtual information center (VIC) of UA studies	System installation			System update			Construct the integrated research environment (TV-conference system, ..)
Development of metadata DB system	Prototype system devel.		Open to public				Design and develop the metadata DB system
Design the Metadata format standards	Ver.1 format						Release the format ver.1 and keep updating if necessary
Development of data analysis software tools	Specifications and basic design		Open to public				Develop and release analysis softwares for UA data
Maintenance&extension of existing DBs of Observation data				Effort focused on old data from Y2012 on			Incorporate non-DB'd data into the DBs
Metadata generation				Effort focused on old data from Y2012 on			Generate metadata in the designated format and add to metadata DB
Operation of metadata DB							Release the metadata DB for community
VIC extension to related fields							Wrap up the project and discuss further extension

Design of Metadata format

Ver. 1 metadata format : SPASE with some modifications



SPASE

http://www.spase-group.org/

Data model and associated metadata format developed by international consortium to comprehensively describe research resources regarding heliospheric and magnetospheric physics

Features:

- **Suitable for STP data (ongoing development/improvement)**
- **Applicable to upper atmosphere (UA) data**
- **Widely-used, such as VxO**
- **Format, related software are open for community**
- **Elements/terms easily appendable (XML)**
- **Metadata description with XML files**

Metadata examples

- Resource ID assigned for all resources. Each MD is described as XML
- Registered in DB by category

NumericalData:
- ResourceID: spase://IUGONET/NumericalData/superdarn/hok
- ResourceHeader:
  - ReleaseDate: 2006-11-06
  - ExpirationDate: 2199-12-31
  - Description: The Hokkaido HF radar, a member of Super Dual Auroral Network Radar (SuperDARN)
  - Contact:
    - PersonID: spase://IUGONET/Person/Nozomu.Nishitani
    - Role: PrincipalInvestigator
  - InformationURL:
    - URL: http://center.stelab.nagoya-u.ac.jp/hokkaido/
- AccessInformation:
  - AccessRights: Restricted
  - RepositoryID: spase://IUGONET/Repository/STEL/superdarn/hok
  - AccessURL:
    - URL: http://center.stelab.nagoya-u.ac.jp/hokkaido/
  - Format: Binary
  - Encoding: BZIP2
- InstrumentID: spase://IUGONET/Instrument/superdarn/hok
- MesurementType: Dopplergram
- SpectralRange: RadioFrequencies
- ObservedRegion: Earth.NearSurface.Ionosphere.FRegion
- ObservedRegion: Earth.NearSurface.Ionosphere.Eregion

For dataset (NumericalData)

For observation instrument (Instrument)

Instrument:
- ResourceID: spase://IUGONET/Instrument/superdarn/hok
- ResourceHeader:
  - ResourceName: SuperDARN Hokkaido HF radar
  - ReleaseDate: 2006-11-06
  - Description: The Hokkaido HF radar, a member of Super Dual Auroral Network Radar (SuperDARN)
  - Contact:
    - PersonID: spase://IUGONET/Person/Nozomu.Nishitani
    - Role: PrincipalInvestigator
  - InformationURL:
    - URL: http://center.stelab.nagoya-u.ac.jp/hokkaido/
- InstrumentType: Dopplergram
- ObservatoryID: spase://IUGONET/Observatory/superdarn/hok

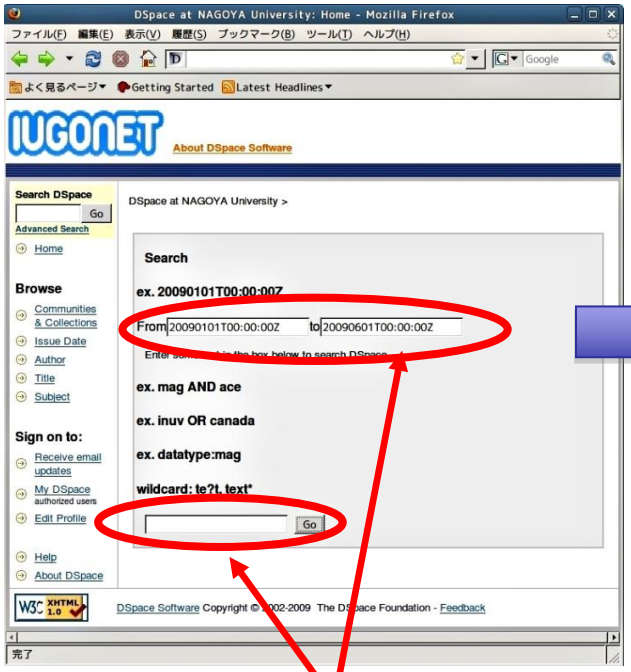
Observatory:
- ResourceID: spase://IUGONET/Observatory/superdarn/hok
- ResourceHeader:
  - ResourceName: SuperDARN Hokkaido HF radar
  - ReleaseDate: 2006-11-06
  - Description: The Hokkaido HF radar, a member of Super Dual Auroral Network Radar (SuperDARN)
  - Contact:
    - PersonID: spase://IUGONET/Person/Nozomu.Nishitani
    - Role: PrincipalInvestigator
  - InformationURL:
    - URL: http://center.stelab.nagoya-u.ac.jp/hokkaido/
- Location:
  - ObservatoryRegion: Earth.Surface
  - CoordinateSystemName: GEO
  - Latitude: 43.53
  - Longitude: 143.61
  - Elevation: 480.0

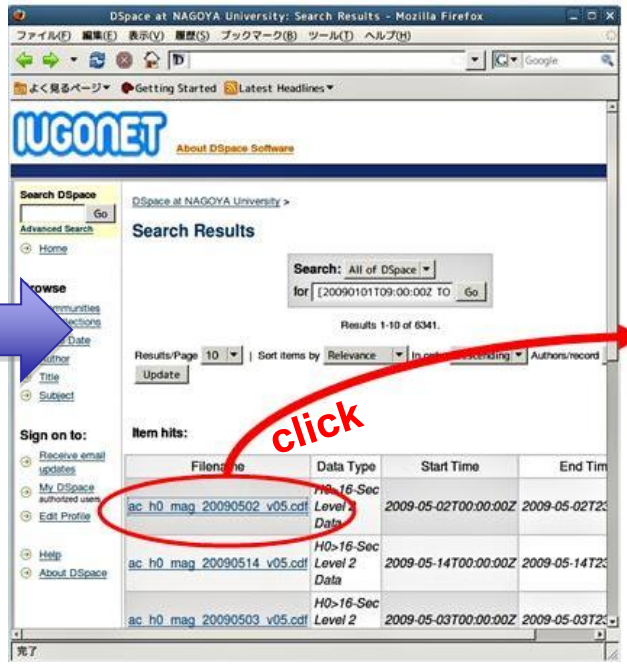
For observation site (Observatory)

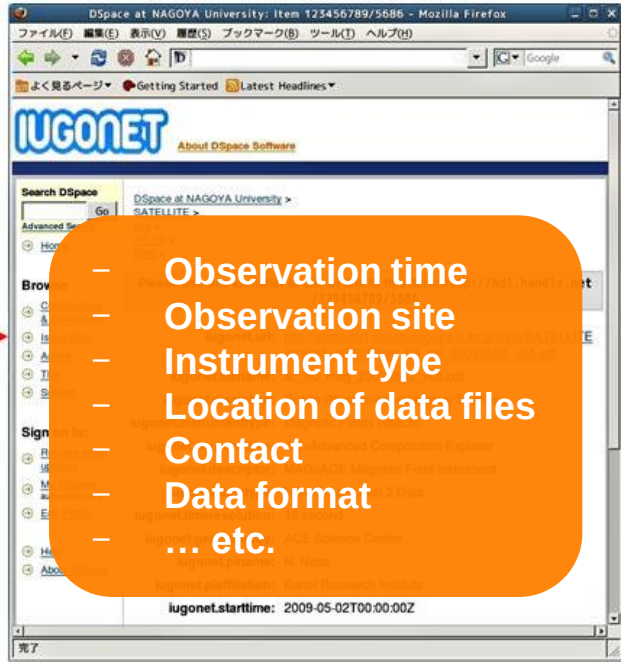
Relation between resources is described by “ResouceID”

Development of Metadata DB

We are now developing the prototype of system for registering, searching, providing, and collecting metadata of our research field using a repository software (DSpace).







Search system by time range and/or free keywords (ex. meteor radar)

List of data sets/files satisfying the input conditions

Detailed metadata

➔Lead to data files!

IUGONET web site

URL : http://www.iugonet.org/en

Summary

- The “IUGONET” project has just started up.
- We develop a metadata DB to facilitate the efficient use of the upper atmospheric data, and thereby promote comprehensive, multi-disciplinary studies.
- Currently the metadata DB system is being developed on the basis of DSpace in which metadata are stored in the SPASE-based format.
- The metadata DB will also be of great help for the Asian-Oceanian radar community to facilitate new researches by utilizing each other’s data.